Python Programming

Comments & Markdown

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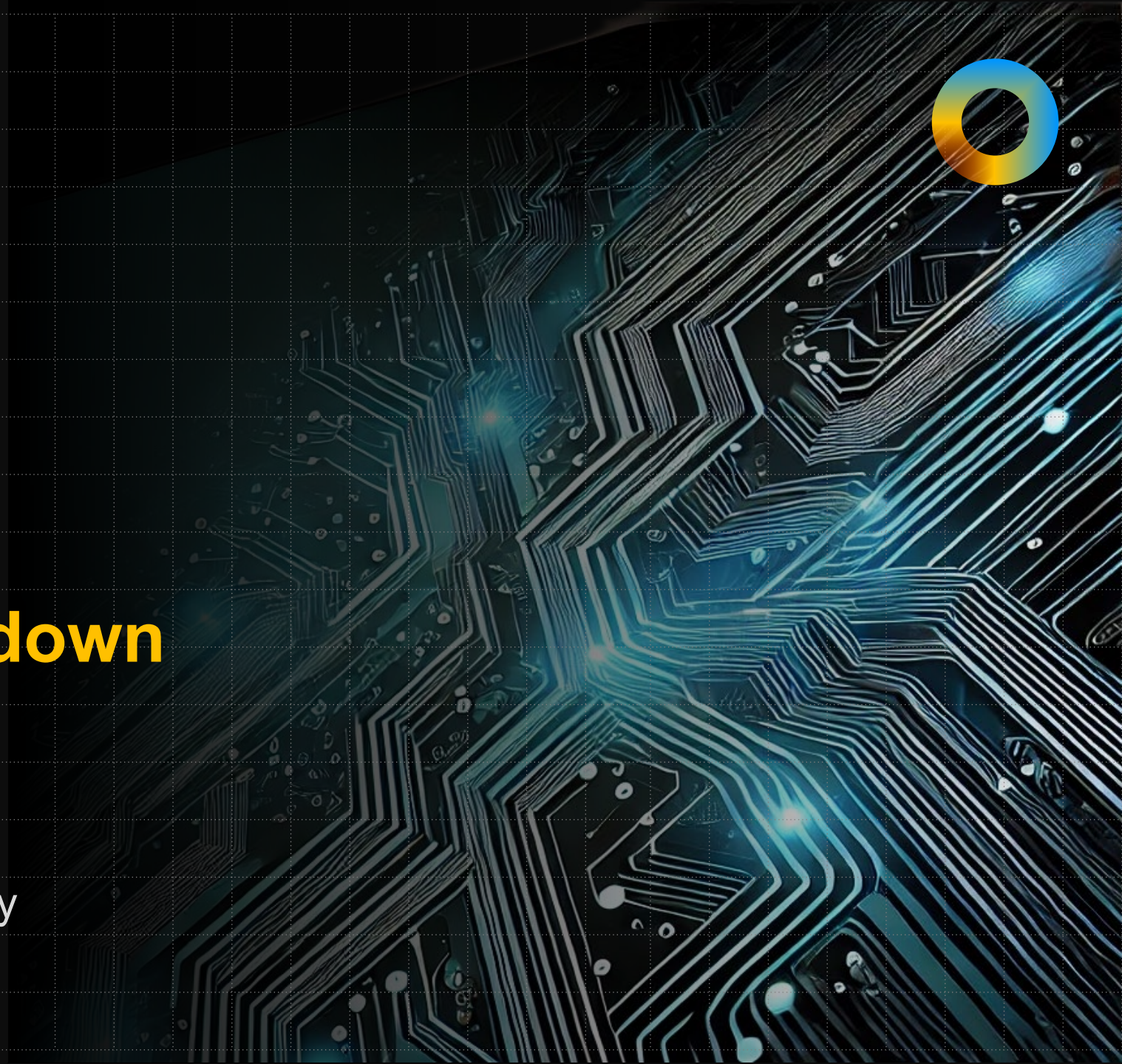


Outlines

- Comments
- Markdown
  - Web Mode
  - LaTeX

Why Do We Need Comments in Codes?

- In large-scale software projects, collaboration among multiple developers is often essential. However, each team member may have distinct coding styles, naming conventions, and architectural preferences. These differences can complicate code reviews, create friction during development, and even introduce critical bugs if the code base becomes inconsistent. Over time, misalignment in coding practices can lead to higher maintenance costs and make troubleshooting significantly more difficult.

Why Do We Need Comments in Codes?

- Conversely, when working on smaller projects, it's surprisingly easy to forget design details and implementation logic—especially if the code or algorithm isn't well documented. Without a clear record of why certain choices were made, developers may be forced to rewrite or re-implement existing components to make minor adjustments. This rework happens simply because the original reasoning, structure, or approach has been lost, leading to unnecessary duplication of effort.

Comments – Single Line

- In both the Python file (.py) and the Jupyter Notebook (.ipynb), we have two comment styles for single-line comments and multiline comments.

```
# single comment
A = [1.2, 3.14, 100] # this is a list
print(A)
# 1st line comment
# 2nd line comment
print(B)
```

Comments – Multiline

- Multiline comment style in both Jupyter Notebook and python file:

```
# single comment
# 1st line comment
# 2nd line comment
print(123)
```

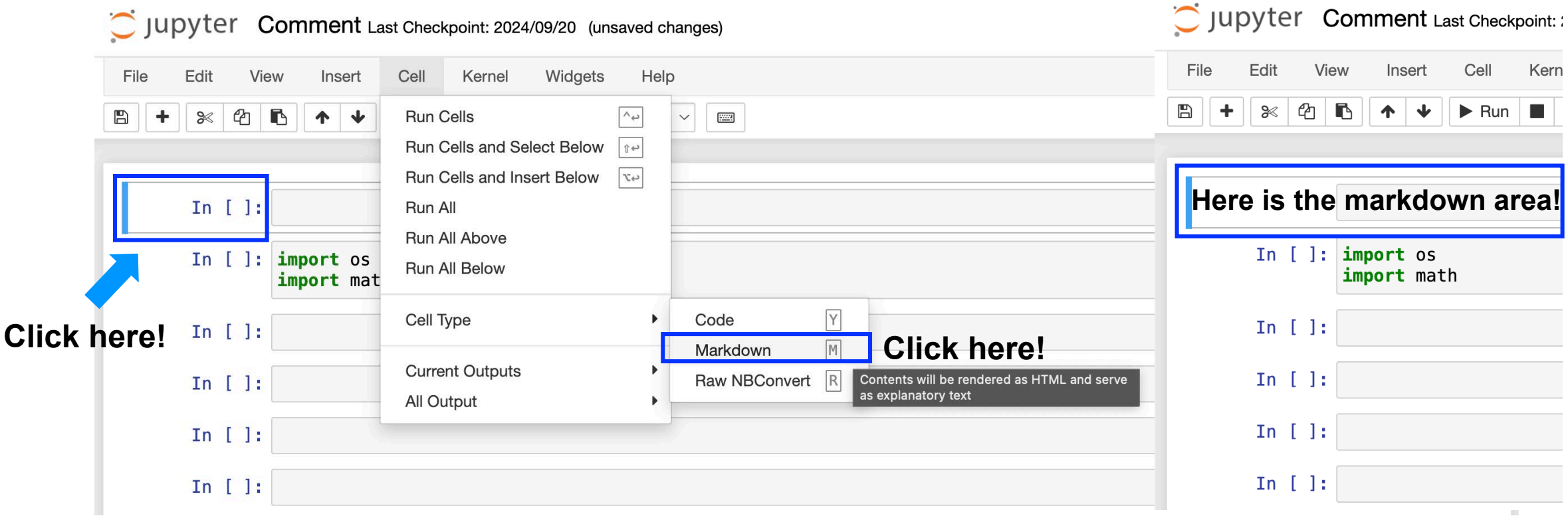
Comments – Multiline

- Multiline comment style in Python file:

```
"""
I am comment
blablabla
"""
print(123)
'''
I am comment, too
blablabla
'''
```

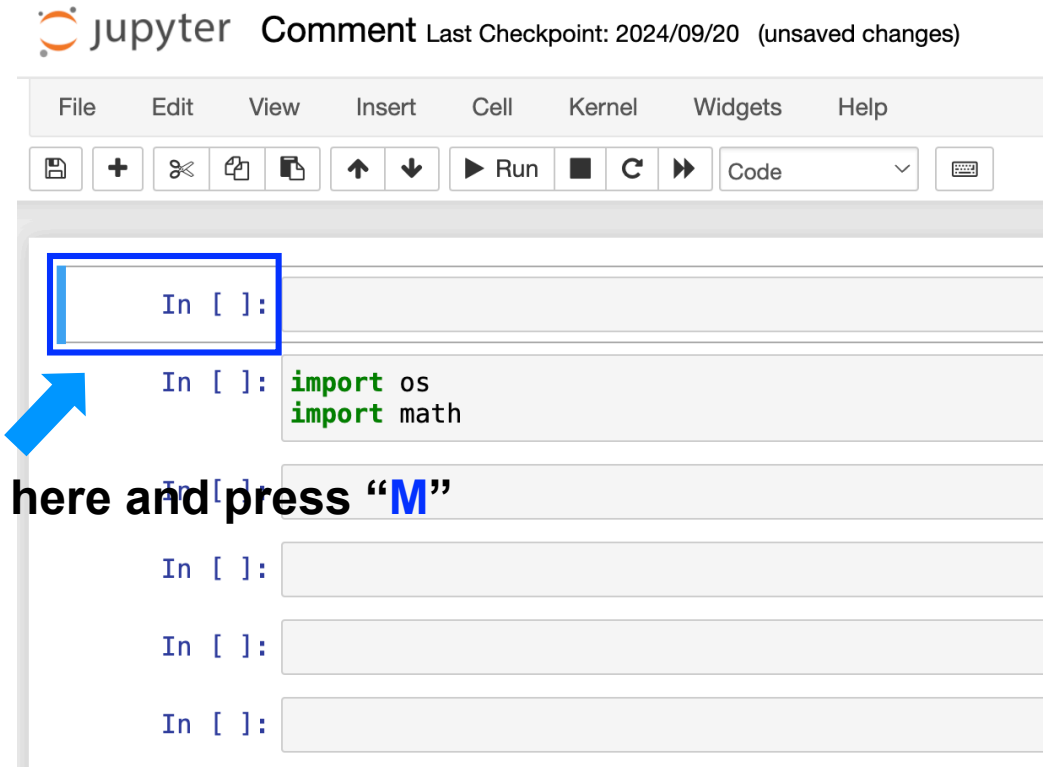
Markdown

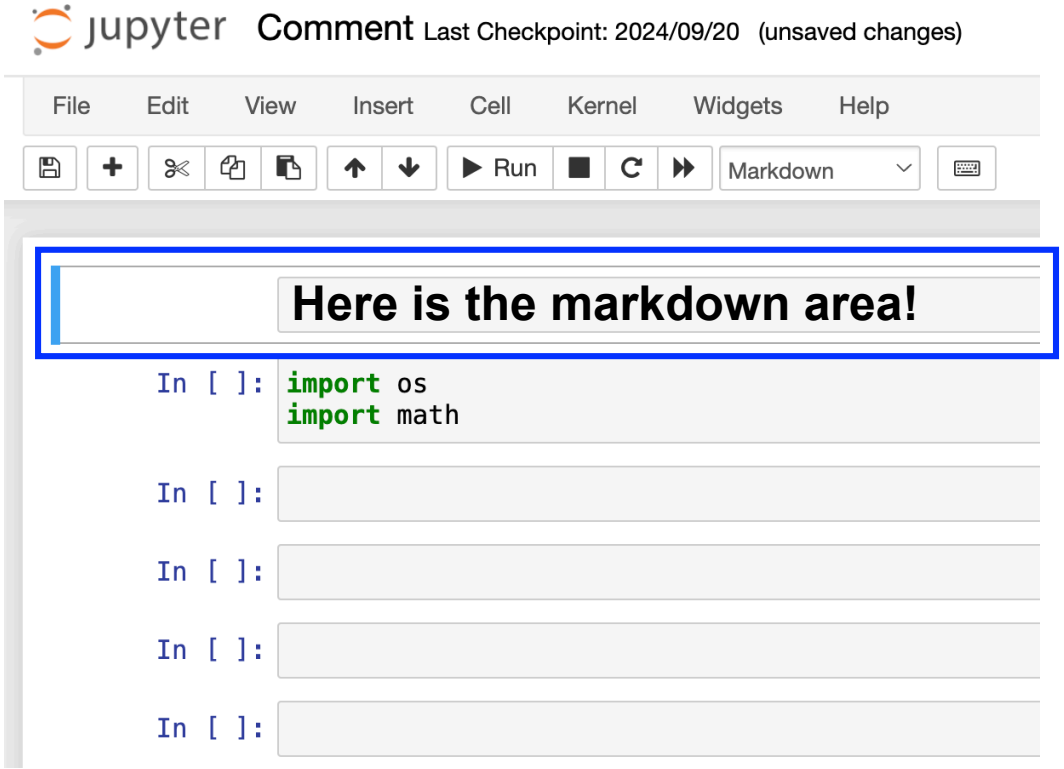
- In Jupyter Notebook, we have another powerful way to make comments in your file.



Markdown

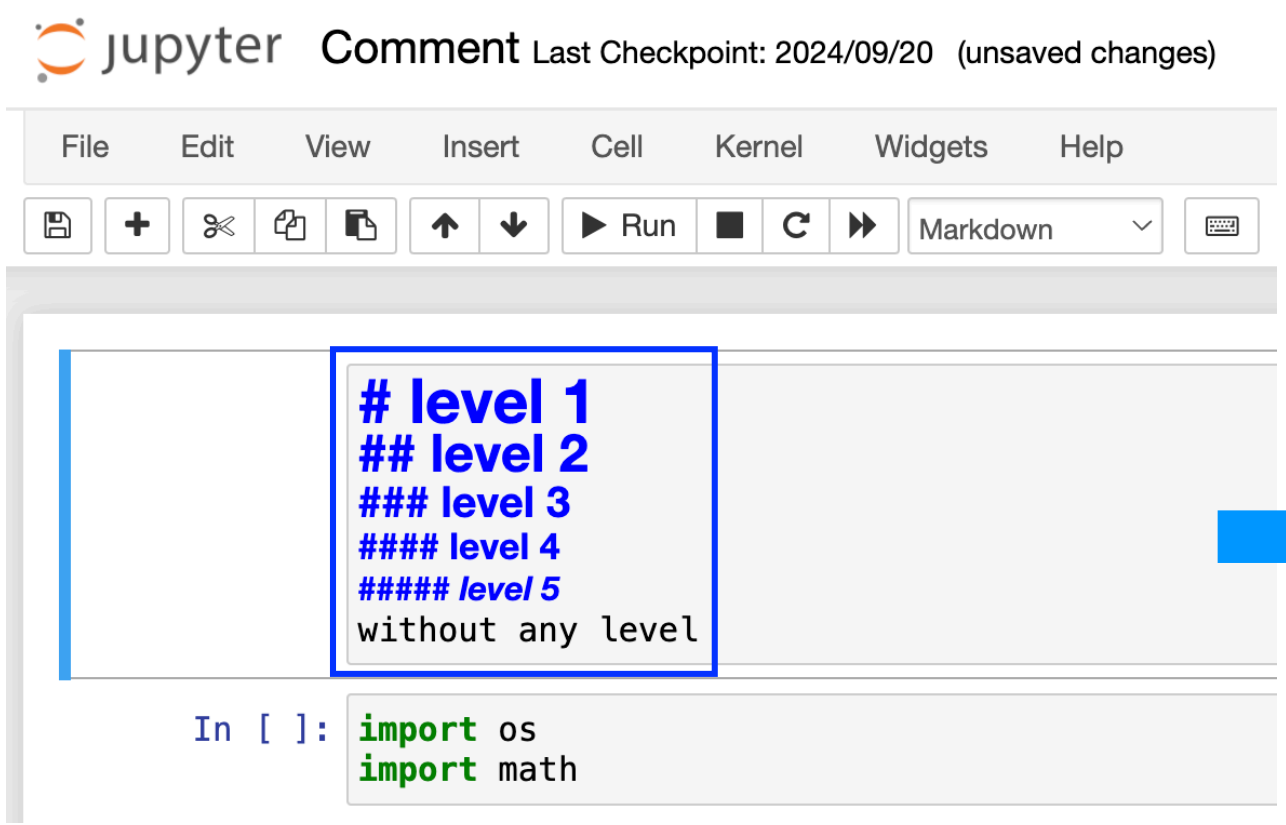
- You may use a shortcut.
- Click the block and press “**M**”.

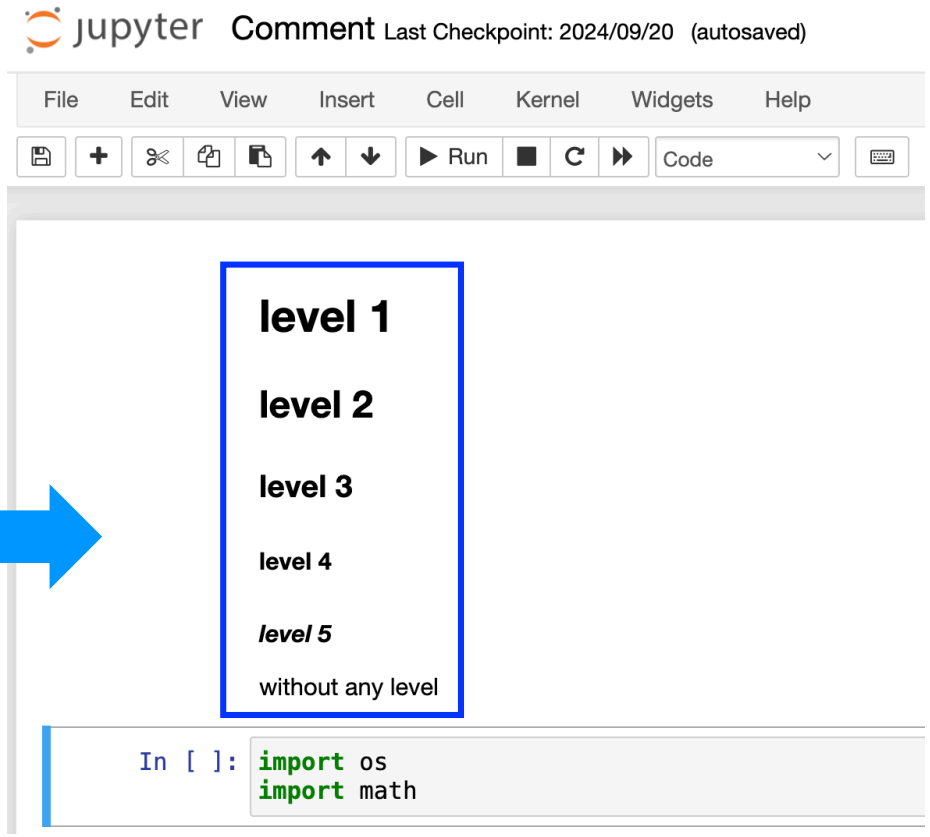




Markdown

- The coding style of Markdown is similar to HTML.





Markdown

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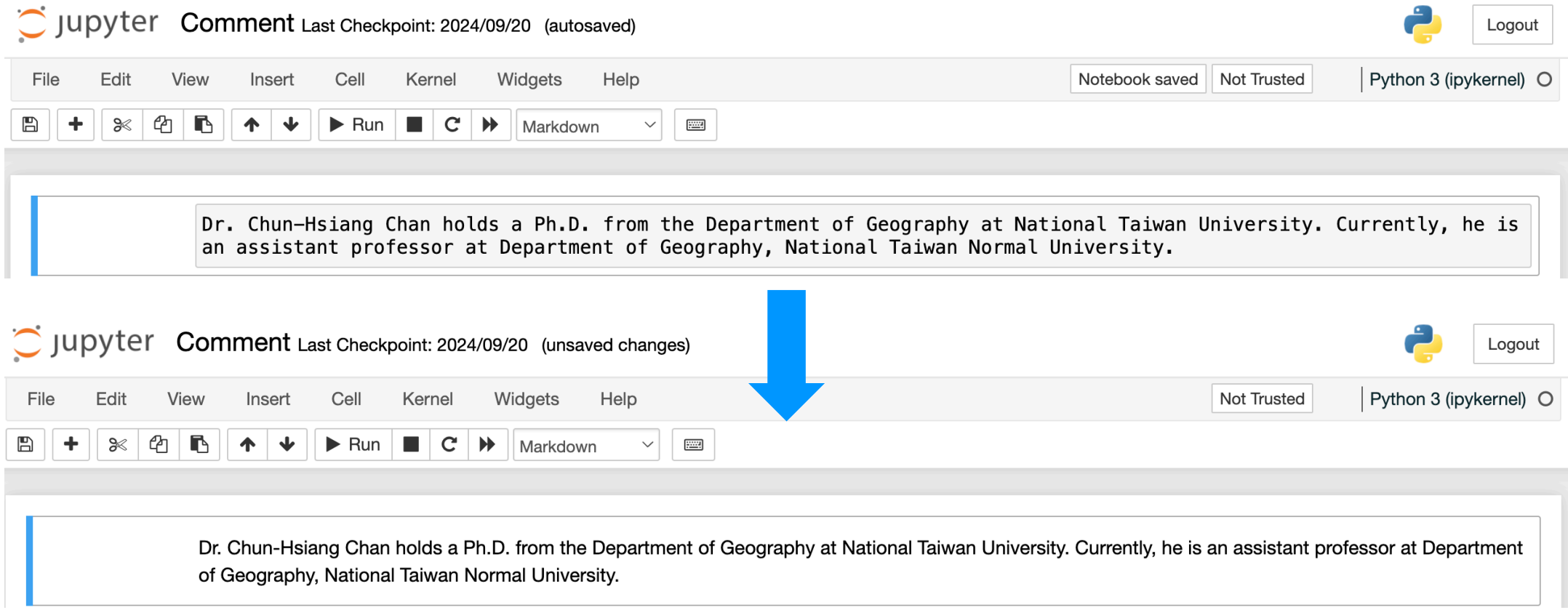
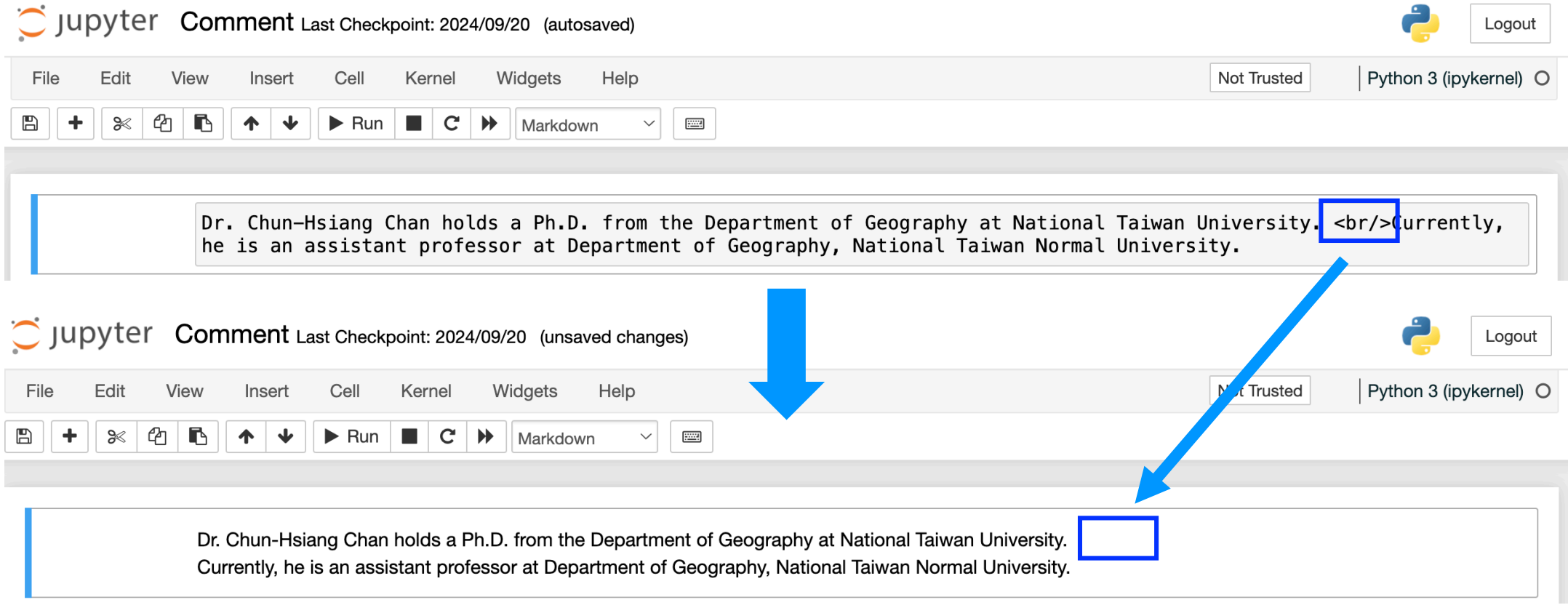


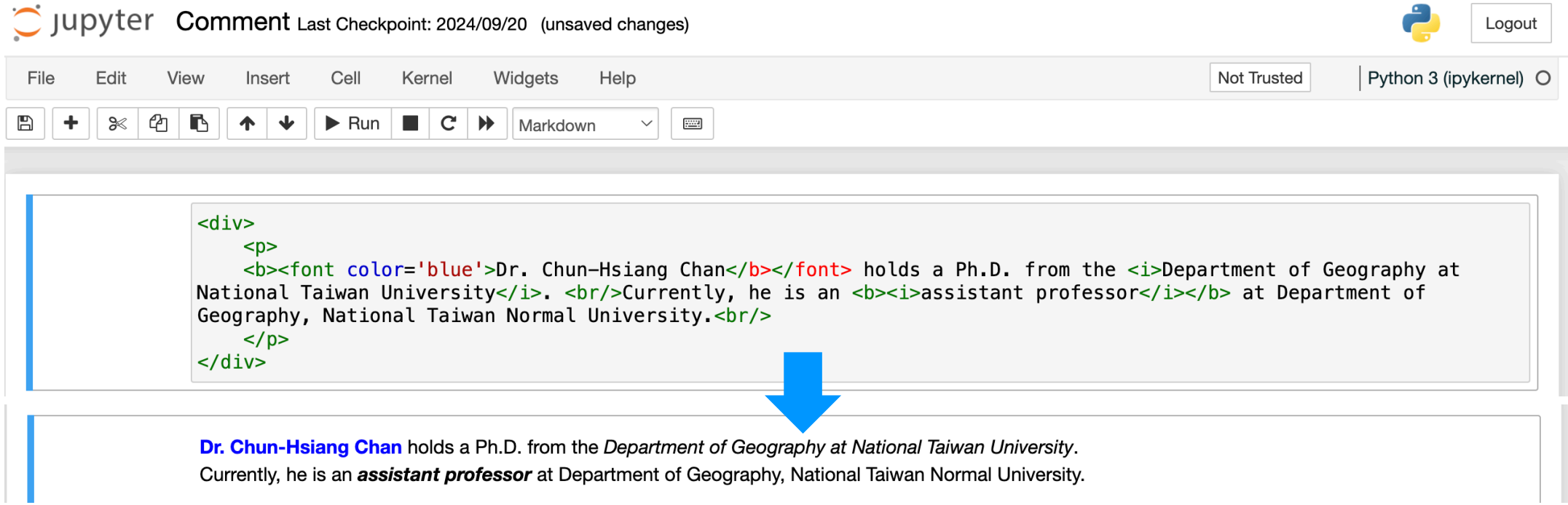
Markdown

- Therefore, we need to use "**
**" to make a newline.



Markdown – Web Mode

- If you want to add some styles for your markdown, then you may read HTML and CSS references.



Please see my ***HTML*** and ***CSS*** slides in **Web Crawler Practice**.

Markdown – LaTeX

- **LaTeX** is a powerful tool for typing mathematical equations.

```
# Evaluation Metrics
### R Squared ($R^2$):
R squared, also called the coefficient of determination, describes the percentage of explanation of dependent
variables by parameters (independent variables). In general, the model fitting results could be divided into two
parts: residual sum of squares and regression sum of squares.<br/>
<b>(1) Residual Sum of Squares:</b><br/>
$$
SSR = SS_{res} = \sum_{i=1}^{n}{(y_i-\hat{y_i})^2}
$$
where $y_i$ is the ground truth values (dependent variable) and $\hat{y_i}$ is the predicted values.<br/>
<b>(2) Total Sum of Squares:</b><br/>
$$
SST = SS_{total} = \sum_{i=1}^{n}{(y_i-\bar{y_i})^2}
$$
where $y_i$ is the ground truth values (dependent variable) and $\bar{y_i}$ is the average value of observation.
<br/>
Hence, the <b>R squared</b> could be calculated by<br/>
$$
R^2 = 1-\frac{SSR}{SST} = 1-\frac{SS_{res}}{SS_{total}} = 1-\frac{\sum_{i=1}^{n}{(y_i-\hat{y_i})^2}}{\sum_{i=1}^{n}
{(y_i-\bar{y_i})^2}}
$$
```

Markdown – LaTeX

- Here is the result!

Evaluation Metrics

R Squared (R^2):

R squared, also called the coefficient of determination, describes the percentage of explanation of dependent variables by parameters (independent variables). In general, the model fitting results could be divided into two parts: residual sum of squares and regression sum of squares.

(1) Residual Sum of Squares:

$$SSR = SS_{res} = \sum_{i=1}^{n} (y_i - \hat{y}_i)^2$$

where y_i is the ground truth values (dependent variable) and $\hat{y}_i$ is the predicted values.

(2) Total Sum of Squares:

$$SST = SS_{total} = \sum_{i=1}^{n} (y_i - \bar{y}_i)^2$$

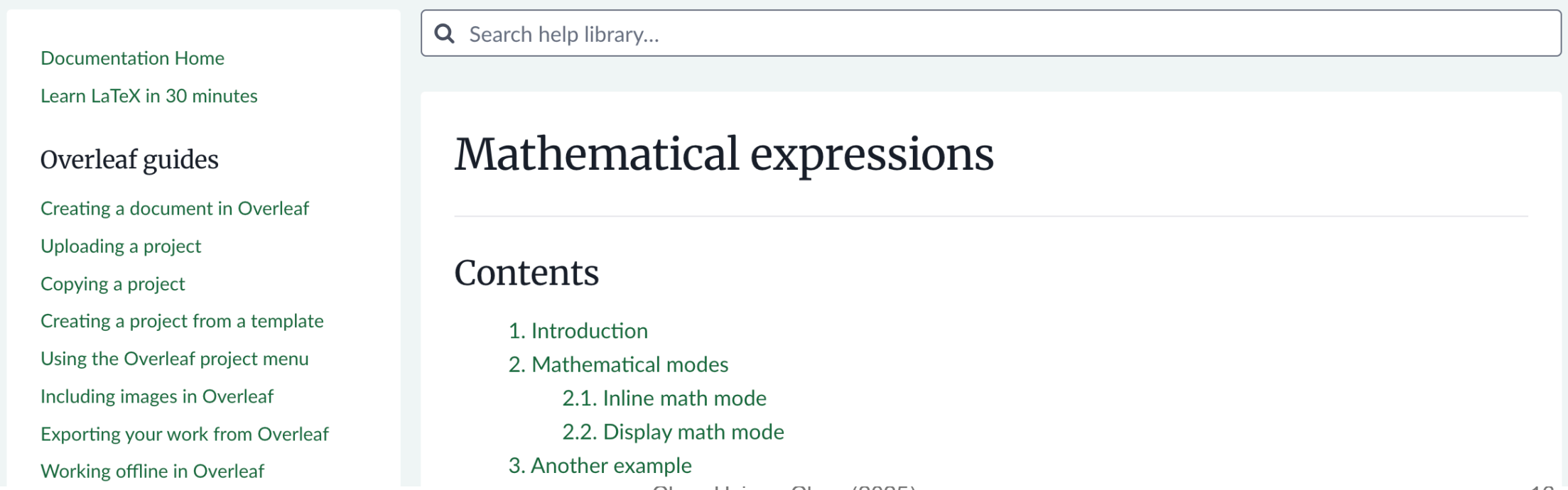
where y_i is the ground truth values (dependent variable) and $\bar{y}_i$ is the average value of observation.

Hence, the **R squared** could be calculated by

$$R^2 = 1 - \frac{SSR}{SST} = 1 - \frac{SS_{res}}{SS_{total}} = 1 - \frac{\sum_{i=1}^{n} (y_i - \hat{y}_i)^2}{\sum_{i=1}^{n} (y_i - \bar{y}_i)^2}$$

Markdown – LaTeX

- If you want more information about LaTeX.
- Please see information.
  https://www.overleaf.com/learn/latex/Mathematical_expressions



The End

Thank you for your attention!

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